Earth's Paleobiosphere

ES-6 The student will demonstrate an understanding of the dynamic relationship between Earth's conditions over geologic time and the diversity of its organisms.

ES-6.2 Recall the divisions of the geologic time scale and illustrate the changes (in complexity and/or diversity) of organisms that have existed across these time units.

Taxonomy level: 1.2-A Remember Factual Knowledge
2.2-B Understand Conceptual Knowledge

Previous/future knowledge: Students were introduced to the geologic time scale and the vast diversity of life that it presents in 8th grade. Earth Science will further develop this concept.

It is essential for students to know that scientists have developed a geologic history of Earth from evidence found in the rock layers.

- The type of rock that makes up the layer and the fossils that are found in each layer help to reveal information about the conditions that existed when the layer formed.
- Fossils also indicate the kinds of organisms that lived during that geologic time.
- Students need to know the major divisions, *eons* and *eras*, and the fact that *periods* within the eras were further divided based on the life-forms that were abundant or became extinct during the time those rocks were deposited.
- A further division during the Cenozoic Era is *epochs*. Since the rock record during this last era is relatively complete with less time for change due to weathering and erosion, different groups of organisms can be used to distinguish the various epochs.

Students should study various illustrations of the geologic time scale noting major geologic events taking place on Earth. They should use the information on the illustrations to note changes in life forms both in the complexity of the organisms (e.g. simple marine invertebrates to plant life to vertebrate amphibians and reptiles to flowering plants to mammals) and the diversity of those life-forms through time.

It is not essential for students to memorize the names of the periods and epochs on the geologic time scale – the order of the major eras is important. Students should not have to identify life forms in existence during various periods or epochs unless a geologic time scale illustration is available for interpretation.

Assessment Guidelines:

The first objective of this indicator is to *recall* the divisions of the geologic time scale; therefore, the primary focus of assessment should be to retrieve relevant knowledge about how this scale is divided from long-term memory.

Another objective of this indicator is to *illustrate* the changes in life forms on Earth over geologic time; therefore, the primary focus of assessment should be to find or use illustrations of the geologic time scale to show how life forms have changed in complexity and diversity over time.

In addition to *recall* and *illustrate* appropriate assessments may require students to:

- *classify by sequencing* the order of the eras on the geologic time scale; or
- *summarize* major changes that occurred in life forms over geologic time.